JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2001, **34,** 97–100 NUMBER 1 (SPRING 2001)

TREATMENT OF MULTIPLY CONTROLLED DESTRUCTIVE BEHAVIOR WITH FOOD REINFORCEMENT

JOHN D. ADELINIS, CATHLEEN C. PIAZZA, AND HAN-LEONG GOH

KENNEDY KRIEGER INSTITUTE AND
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

We evaluated the extent to which the positive reinforcement of communication would reduce multiply controlled destructive behavior in the absence of relevant extinction components. When edible reinforcement for appropriate communication and nonfood reinforcers for problem behavior were available simultaneously, responding was allocated almost exclusively toward the behavior that produced edible reinforcement.

DESCRIPTORS: differential reinforcement, multiple control, establishing operations, concurrent schedules

Several investigators have examined the effects of arbitrary reinforcement in the treatment of problem behavior. For example, Lalli et al. (1999) examined the use of edible reinforcers in the differential reinforcement of compliance during treatment of escape-maintained problem behavior of 5 participants. Lalli et al. demonstrated that edible reinforcers were substantially more effective as reinforcement for compliance even though problem behavior continued to produce escape. In addition, the Lalli et al. investigation replicated previous research showing that positive reinforcement of compliance produced concomitant reductions in problem behavior. The current investigation extends the work of Lalli et al., by delivering edible reinforcement following communication (rather than compliance), and by applying the intervention to multiply controlled aggression (rather than behavior maintained by a single source of reinforcement).

This investigation was supported in part by Grant MCJ249149-02 from the Maternal and Child Health Service of the U.S. Department of Health and Human Services.

Requests for reprints should be addressed to Cathleen C. Piazza, The Marcus Institute, 1605 Chantilly Dr., Atlanta, Georgia 30324-3268.

METHOD

Paul was a 12-year-old boy who had been diagnosed with autism, attention deficit hyperactivity disorder, and mild to moderate mental retardation. He had been admitted to an inpatient hospital unit for the treatment of aggression (defined as hitting, kicking, and pulling the hair of others and throwing objects within 1 m of an individual). Paul spoke in two- to three-word sentences and could follow two- to four-step instructions. Sessions were conducted in a treatment room (6 m by 6 m). Data collectors recorded occurrences of aggression and appropriate communication (handing a picture card to a therapist) on laptop computers. Two observers independently collected data for 35%, 42%, 68%, and 46% of sessions during the functional, demand, differential reinforcement (attention), and differential reinforcement (demand) analyses, respectively. Exact agreement coefficients were calculated by dividing the total number of agreements by the number of agreements plus disagreements and multiplying by 100%. An agreement was defined as two independent observers agreeing on the exact frequency of a response observed within a given 10-s interval. Mean exact agreement coefficients for aggression exceeded 92.7%

in all conditions. Mean agreement coefficients for appropriate communication exceeded 97.6%.

A functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) was conducted using a reversal design and included social attention, play, tangible (M&Ms®), and demand conditions (using prevocational and daily living tasks). (The results of the functional analysis are published in Piazza et al., 1999.) Subsequently, Paul's educational aide reported that aggression occurred during specific academic tasks (e.g., tracing, reading, matching, etc.). Therefore, a test-control analysis was conducted in which demand and play conditions were alternated in a multielement design (Iwata, Duncan, Zarcone, Lerman, & Shore, 1994).

Differential reinforcement (attention) analysis. An ABAB design was used to evaluate the effects of an edible reinforcer for communication in the attention condition. Baseline was identical to the attention condition of the functional analysis in which a verbal reprimand was provided for occurrences of aggression. Following baseline, a preference assessment was conducted (Fisher, Piazza, Bowman, & Amari, 1996). The most preferred item (candy in the form of peanut butter cups) was used as the edible reinforcer. M&Ms®, the edible item used in the functional analysis, ranked second. Subsequently, a communicative response was trained. The procedures for the differential-reinforcement-without-extinction phase were identical to baseline (i.e., a therapist sat across the room and read a magazine) except for the presence of the communication card. Appropriate communication resulted in 30-s access to the candy. The therapist delivered the edible item by extending his or her arm directly in front of himself or herself while avoiding eye contact with Paul. As in baseline, occurrences of aggression resulted in a verbal reprimand.

Differential reinforcement (demand) analysis. The edible reinforcer was also evaluated in the demand condition using an ABAB design. The data from the demand functional analysis served as the baseline. Academic demands (e.g., tracing, reading, matching, etc.) were delivered using a three-step prompting sequence (verbal, gestural, physical). Compliance following either the verbal or gestural prompt resulted in brief verbal praise (e.g., "great job"). When noncompliance followed the gestural prompt, the therapist physically guided Paul to complete the demand. However, the occurrence of aggression at any point during the prompting sequence resulted in the termination of the demand for 30 s (i.e., escape). The differential-reinforcement-without-extinction phase was similar to baseline, in that demands were presented using a three-step prompting sequence and demand presentation was terminated for occurrences of aggression. The picture card (as described above) was available, and 30-s access to the food was provided for occurrences of appropriate communication. However, demand presentation, using the same prompting sequence, was not suspended and continued during the reinforcement interval. In addition, Paul could continue to obtain the edible reinforcer during the escape interval. That is, positive reinforcement (i.e., edible item) and negative reinforcement (i.e., escape) could be obtained simultaneously.

RESULTS AND DISCUSSION

During the first functional analysis (see Piazza et al., 1999), aggression occurred at near-zero levels across all conditions except the social attention condition ($M = 6.3$ responses per minute). Mean rates of aggression during the test-control analysis (first phase in the bottom panel of Figure 1) were 0.07 and 0.54 responses per minute in the toy play and demand conditions, respectively. The results of the functional and test-

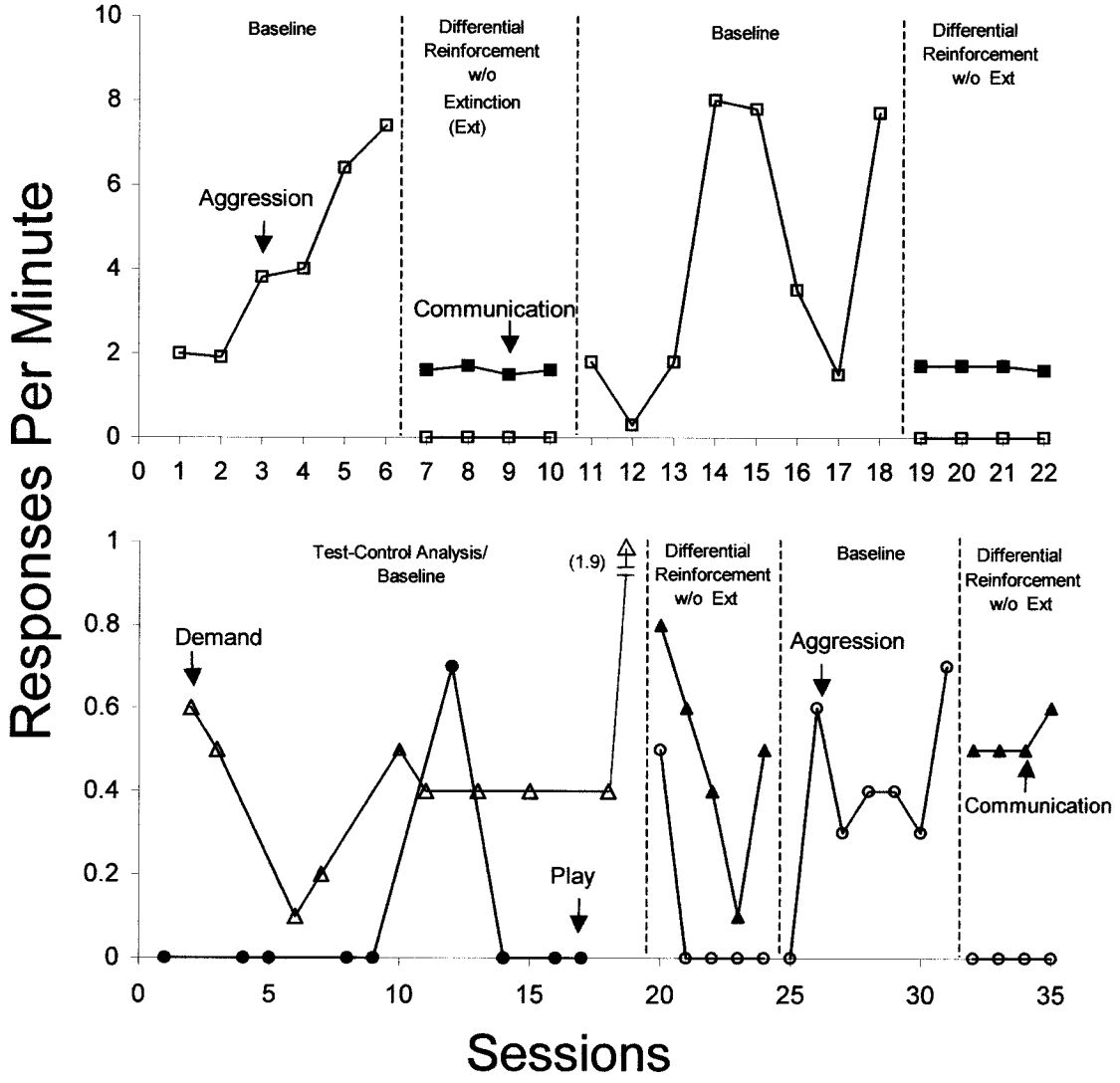

Figure 1. The top panel depicts results of the differential reinforcement (attention) analysis. The bottom panel depicts the results of the test-control analysis (first phase) and the subsequent differential reinforcement (demand) analysis.

control analyses suggested that both access to attention and escape maintained Paul's aggression. The mean rates of aggression during the differential reinforcement (attention analysis) (top panel of Figure 1) were 4.8 and 0 during the baseline and differential-reinforcement-without-extinction phases, respectively. During the differential reinforcement (demand) analysis (bottom panel of Figure 1), mean rates of aggression were 0.4 and 0.06 during the baseline and differential-reinforcement-without-extinction phases, respectively. The mean rates of appropriate communication in the differential reinforcement (attention) and differential reinforcement (demand) analyses were 1.5 and 0.5, respectively. In addition, the mean frequencies of demands presented during the baseline and the differential-reinforcement-without-extinction phases were similar (M = 35.4 and M = 41.4, respectively).

In the current investigation, food was

used for reinforcement of communication to reduce Paul's escape- and attention-maintained destructive behavior. These findings are similar to those of Lalli et al. (1999), in that an edible reinforcer was used to increase appropriate behavior and decrease problem behavior in the absence of relevant extinction components. However, results of the current investigation extend those of Lalli et al. by demonstrating reinforcement effects for a response other than compliance (i.e., communication) and by demonstrating the efficacy of such procedures as treatment of multiply controlled problem behavior. Although significant behavioral reductions were observed, the mechanism by which these reductions were obtained is not clear. It is unclear if reductions in destructive behavior were a result of altering the establishing operations for attention- and escape-maintained aggression or were a result of direct competition between concurrent schedules of reinforcement. For example, the contingent provision of food may have weakened the value of both attention and escape as reinforcers. Alternatively, a preference for the edible reinforcer may have influenced responding without having directly altered the value of attention and escape as reinforcers. Future investigations should examine the issue of motivational effects and schedule competition. A comparison of the effects of noncontingent and contingent availability of food might address this issue. Results of the current investigation suggest that using edible reinforcement may be viable in cases in which the functional reinforcer is unavailable (e.g., caregiver is in the shower), is deleterious to deliver (e.g., allowing an individual to avoid taking medicine), or is not acceptable to caregivers (e.g., allowing a child to escape academic instruction). Finally, because food reinforcers were used, additional studies should be conducted to assess the practicality of these procedures throughout the day. In other words, if satiation occurs, attention- and escape-maintained behavior may reemerge. One possible approach would be to make the food available only during low-attention or high-demand contexts to reduce the likelihood of satiation.

REFERENCES

Fisher, W. W., Piazza, C. C., Bowman, L. G., & Amari, A. (1996). Integrating caregiver report with a systematic choice assessment to enhance reinforcer identification. *American Journal on Mental Retardation, 101,* 15–25.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27,* 197–209. (Reprinted from *Analysis and Intervention in Developmental Disabilities, 2,* 3–20, 1982)

Iwata, B. A., Duncan, B. A., Zarcone, J. R., Lerman, D. C., & Shore, B. A. (1994). A sequential, test-control methodology for conducting functional analyses of self-injurious behavior. *Behavior Modification, 18,* 289–306.

Lalli, J. S., Vollmer, T. R., Progar, P. R., Wright, C., Borrero, J., Daniel, D., Barthold, C. H., Tocco, K., & May, W. (1999). Competition between positive and negative reinforcement in the treatment of escape behavior. *Journal of Applied Behavior Analysis, 32,* 285–296.

Piazza, C. C., Bowman, L. G., Contrucci, S. A., Delia, M. D., Adelinis, J. D., & Goh, H. (1999). An evaluation of the properties of attention as reinforcement for destructive and appropriate behavior. *Journal of Applied Behavior Analysis, 32,* 437–449.

Received September 20, 1999
Final acceptance November 19, 2000
Action Editor, Timothy R. Vollmer